

IN THE CLAIMS:

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1. (Currently Amended) A power supply apparatus for a vehicle, comprising:

an electric power line comprising a plurality of sequentially connected segments wired in an interior of a vehicle from a battery, for supplying power to various kinds of loads of said vehicle via a plurality of modules which are connected to receive electric power via respective segments of said electric power line;

a semiconductor switching element connected between each respective segment and a load supplied by said segment for controlling electric power to said load;

a plurality of short sensors for detecting a short circuit in at least one of said plurality of segments of said electric power line, said at least one segment connecting respective modules;

a power supply shutdown means connected in series with each segment of said electric power line connecting respective modules, said power supply shutdown means being connected in series with said semiconductor

switching element to supply electric power to said semiconductor switching means;

a control circuit for specifying a short circuited segment of said electric power line in accordance with a short detection condition of said plurality of short sensors; and

means responsive to signals from said control circuit for cutting off the power supply cutoff means, and removing the short circuited segment from said electric power line for supplying power to said loads; wherein,-

the electric power line includes a plurality of sensor electric lines which form outer layer portions of the respective segments of the electric power line, and are provided with a short detecting potential;

the sensor lines are divided into connecting portions for the respective control modules of the electric power line, or in connecting portions at a midpoint of the electric power line; and

a short circuit in a particular segment is predicted based on a change of the potential of the plurality of sensor lines.

2. (Previously Amended) A power supply apparatus for a vehicle according to claim 1, further comprising:

a connector for connecting said electric power line segments to each other arranged between respective short sensors.

3. (Previously Amended) A power supply apparatus for a vehicle, comprising:

a battery;

a load drive electric power line wired in an interior of a vehicle from the battery through a first fuse, for driving a vehicle load;

a control circuit drive electric power line wired in said interior of said vehicle from a battery through a second fuse, for driving a control apparatus; and

at least one control apparatus including:

a control circuit which is supplied with power from said control circuit drive electric power line; and

a load drive circuit provided between said load drive electric power line and said load, for controlling a supply of a power to said load in response to a signal from said control circuit.

4. (Previously Amended) A power supply apparatus for a vehicle according to claim 3, further comprising:

an over-current detection apparatus provided between said load drive circuit and said first fuse, for detecting an over-current condition of said load drive circuit and communicating said detected current condition to said control circuit; and

a shutdown circuit for performing a shutdown of an electric line between said fuse and said load drive circuit in response to a signal from said control circuit.

5. (Previously Amended) A power supply apparatus for a vehicle according to claim 3, further comprising:

a short sensor for detecting a short circuit of said load drive electric power line; and

a shutdown circuit for performing a shutdown of an electric line between said first fuse and said load drive circuit in response to a signal from said short circuit through said control circuit.

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6. (Previously Amended) A power supply apparatus for a vehicle according to claim 3, wherein:

said control apparatus includes a communication control circuit;

a first control apparatus and a second control apparatus are connected to each other by a communication line; and

supply and interruption of power to a load of said second control apparatus is controlled in response to a condition of a switch which is inputted to said first control apparatus.

7. (Previously Amended) A power supply apparatus for a vehicle, comprising:

a battery;

a first power supply circuit wired in an interior of a vehicle through a first fuse from the battery, for supplying power to a plurality of loads of said vehicle;

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a second power supply circuit wired in said interior of said vehicle through a second fuse from the battery, for supplying power to a control circuit of a control apparatus for controlling said load; and

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a protection circuit for detecting a short circuit of said first power supply circuit and for implementing a protection control of said first power supply circuit through said control circuit.

8. (Currently Amended) A power supply apparatus for a vehicle, comprising:

a battery;

a first power supply system wired in an interior of a vehicle through a first circuit including a first fuse from the battery, for supplying power to a running control load of said vehicle;

a second power supply system wired in said interior of said vehicle through a second circuit including a second fuse from said battery, for supplying power to an equipment system load of said vehicle; and

a third power supply system wired in said interior of said vehicle through a third circuit including a third fuse from said battery, for supplying power to a control circuit for controlling said equipment system load; wherein,

the electric third power supply system also supplies electric power to a control circuit for controlling said running control load of the vehicle.

9. (Currently Amended) A power supply control apparatus for a vehicle, comprising:

a vehicle mounted power supply;

a vehicle mounted load for receiving a supply of a power from said vehicle mounted power supply through a driver circuit;

a fuse connected between said vehicle mounted power supply and said driver circuit;

a shutdown circuit provided between said driver circuit and the fuse; and

a control circuit for providing a circuit shutdown signal to said shutdown circuit; wherein,-

the control circuit supplies a control signal to the driver circuit.

10. (Currently Amended) A power supply apparatus for a vehicle, comprising:

a vehicle mounted power supply;

a plurality of control modules, each having a control circuit in which a load drive signal is generated and a load drive circuit for controlling a power supply to a load according to a drive signal from said control circuit;

a first, relatively larger power line for supplying load drive power from said vehicle mounted power supply through a first fuse via at least two of said control modules; and



a second, relatively smaller power line for supplying control circuit power from said vehicle mounted power supply through a second fuse via control circuits of said respective control modules; wherein,-

the small power line is thicker than the large power line.

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11. (Currently Amended) A load control module of an electric power supply apparatus for a vehicle, said load control module comprising:

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a communication circuit which is connectable to at least one other module of said power supply apparatus through a communication line;

a control circuit for outputting a load control signal in accordance with a signal which is inputted through said communication circuit;

a drive circuit connected to an electric power line that is coupled between said control module and said other module, modules, for controlling a power supply to a load of said vehicle in accordance with an output signal from said control circuit; and

a relay for opening and closing a connection that branches from said power line to a particular load as a function of an output from said control

circuit, said relay opening and closing in response to load control signals output from said control circuit; wherein,-

the control module includes a fuse for connecting the particular load and the relay.

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12. (Previously Amended) A power supply apparatus for a vehicle according to claim 8, comprising further:

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at least one of an ignition coil switch and an accessory switch connected to said battery through a fourth fuse; and

a separate power supply system for supplying power from said at least one of an ignition coil switch and an accessory switch, to a fifth fuse.

13. (Currently Amended) A power supply apparatus for a vehicle, comprising:

a load control apparatus for receiving load drive power from a vehicle mounted power supply through an ignition switch and a first fuse which is connected in series to said ignition switch;

a second control apparatus for receiving power from said vehicle mounted power supply through a second fuse; and

a backup power supply line for supplying power from said second control apparatus to said load control apparatus; wherein,-

the second control apparatus is connected to the backup electric power line upstream of the ignition switch through the second fuse.

14. (Previously Amended) A power supply apparatus for a vehicle, comprising:

a control apparatus which distributes electric power from a vehicle mounted power supply through a fuse;

a shutdown apparatus provided in an electric path of a power input portion of said control apparatus;

a first driver circuit for supplying power to a first load through said shutdown apparatus;

a second driver circuit for supplying power to a second load via an indirect circuit path of said shutdown apparatus.

15. - 17. (Cancelled)

18. (Previously Amended) A power supply apparatus for a vehicle, comprising:

a vehicle mounted power source;

a relay having a relay coil which interruptibly receives power from said vehicle mounted power source when at least one of an ignition switch and an accessory switch is closed, and a relay contact which is closed when said relay coil receives power;

a load control module having a power distribution function connected to said vehicle mounted power supply through said relay contact;

said load module comprising:

an input interface for taking in a load operation signal which is given by at least one of another control module and an outside operation signal generation means;

a control circuit for outputting a load drive signal in accordance with said load operation signal which is taken in from said input interface; and

an output interface for outputting said load drive signal to a driver circuit from said control circuit.

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19. (Previously Amended) A power supply apparatus for a vehicle according to claim 18, wherein said input interface has a communication circuit.

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20. (Previously Amended) A power supply apparatus for a vehicle according to claim 18, wherein a fuse is connected between said relay contact and said specific load.

21. (Currently Amended) A power supply apparatus for an automobile, comprising:

a rear control module installed in an area which is rearward of a ~~front~~ driver's seat of the automobile;

a front control module installed in an area which is forward of said ~~front~~ driver's seat of the automobile;

a central control module installed between said front control module and said rear control module;

a rear electric power line for connecting said rear control module and a battery;

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a front electric power line for connecting said front control module and said central control module to said battery;

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an ignition switch connected to an input interface of said central control module;

an ignition relay coil connected to ~~a communication line~~ an output interface of said front control module;

an ignition relay contact which closes and opens in response to a signal of said ignition switch which is inputted to a communication circuit ~~said input interface~~ of said front control module from said central control module; ~~and~~

a specific load to which power from said front side electric power line is supplied and interrupted through said ignition relay contact; and-

at least one additional load to which electric power from the rear electric power is supplied and interrupted through the driver circuit of the rear control module;

wherein, a fusible link is connected between the input side terminal and the output side terminal of the ignition relay.

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22. (Previously Amended) A power supply apparatus for an automobile according to claim 21, further comprising:

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a fuse connected between said ignition relay contact and said specific load.

23. (Previously Amended) A power supply apparatus for an automobile according to claim 22, wherein:

said specific load is one of an alternator and a stator.

24. (Previously Amended) A power supply apparatus for an automobile according to claim 22, wherein said ignition relay and said fuse are received in a relay/fuse box provided adjacent to said control.

25. (Previously Amended) A power supply apparatus for an automobile, comprising:

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a load drive control circuit provided between a power supply of said automobile and a specific load;

a relay provided between said load drive control circuit and said power supply;

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a sleep control circuit for opening a relay contact by stopping the current in flowing a coil of said relay and performing a shutdown of an electric line to said specific load in response to detection that the automobile is not operated and power is not needed in said specific load.

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